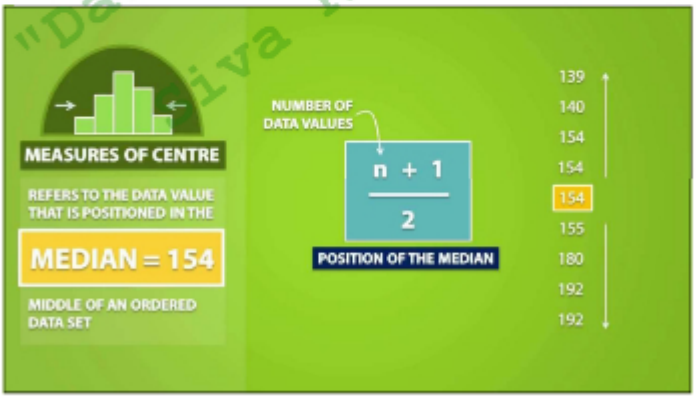
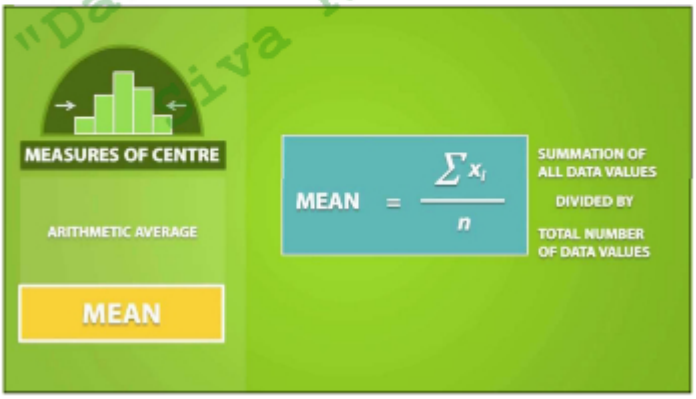
MEASURES of CENTRAL TENDENCY





Population Mean

$$\mu = \frac{\sum X}{N} = \frac{X_1 + X_2 + X_3 + \ldots + X_N}{N}$$
$$= \frac{24 + 13 + 19 + 26 + 11}{5}$$
$$= \frac{93}{5}$$
$$= 18.6$$

Sample Mean

$$\bar{X} = \frac{\sum X}{n} = \frac{X_1 + X_2 + X_3 + \ldots + X_n}{n}$$
$$= \frac{57 + 86 + 42 + 38 + 90 + 66}{6}$$
$$= \frac{379}{6}$$
$$= 63.167$$

Weighted Average

- Sometimes we wish to average numbers, but we want to assign more importance, or weight, to some of the numbers.
- The average you need is the ***weighted average.***

$$Weighted\ \ Average = \frac{\sum xw}{\sum w}$$

where x is a data value and w is the weight assigned to that data value. The sum is taken over all data values.

Example

Suppose your midterm test score is 83 and your final exam score is 95. Using weights of 40% for the midterm and 60% for the final exam, compute the weighted average of your scores. If the minimum average for an A is 90, will you earn an A?

$$Weighted\ Average = \frac{(83)(0.40)+(95)(0.60)}{0.40+0.60}$$
$$= \frac{32+57}{1} = 90.2$$

You will earn an A!

Various Samp

- **Random sampling**
  - Every unit of the population has the s sample.
  - A chance mechanism is used in the se
  - Eliminates bias in the selection proce
  - Also known as probability sampling
- **Nonrandom Sampling**
  - Every unit of the population does not included in the sample.
  - Open the selection bias
  - Not appropriate data collection meth
  - Also known as non-probability sampli

Simple Rand

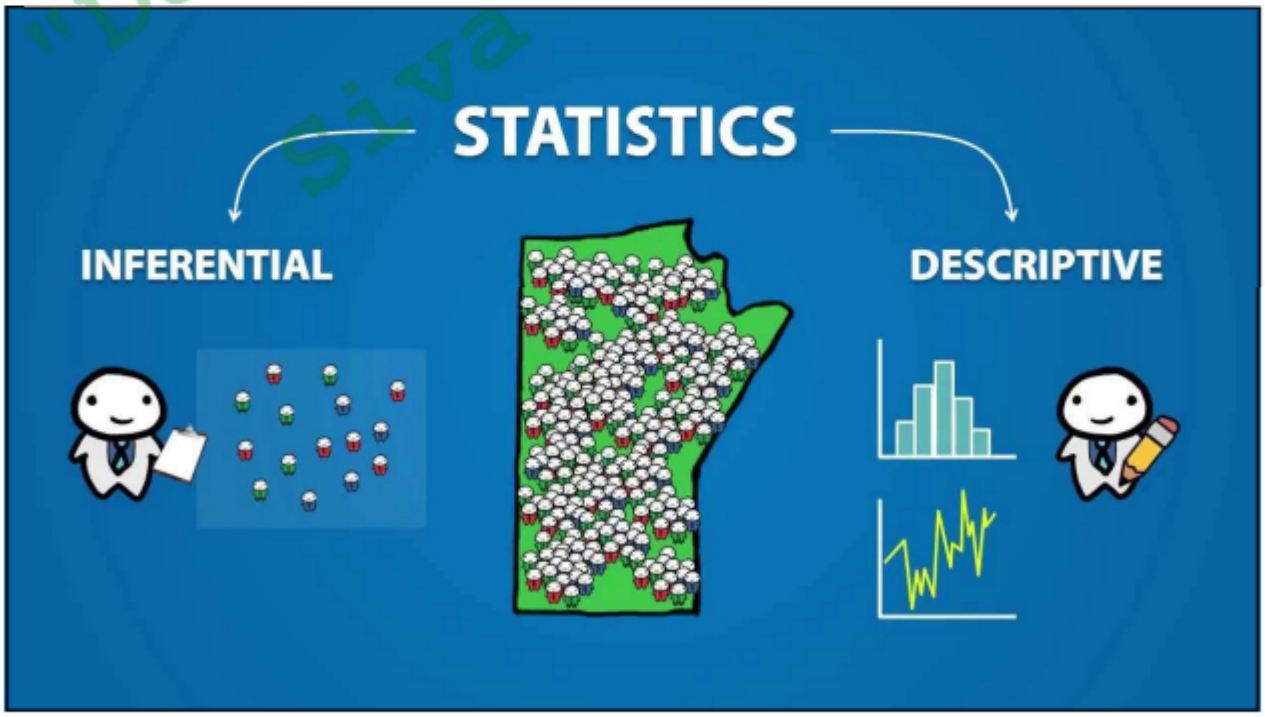
- Every object in the population has a
- Objects are selected independently
- Samples can be obtained from a tab
  random number generators
- A simple random sample is the idea
  are compared

Systematic

- Convenient and relatively easy to administer
- Population elements are an ordered sequence (at least, conceptually).
- The first sample element is selected randomly from the first *k* population elements.
- Thereafter, sample elements are sele at a constant interval, *k*, from the ordered sequence frame.

Nonrando

- **Convenience Sampling:** Sample ele
  of the researcher
- **Judgment Sampling:** Sample eleme
  researcher
- **Quota Sampling:** Sample elements
  satisfied
- **Snowball Sampling:** Survey subject
  other survey respondents



Descriptive vs Inferential Statistics

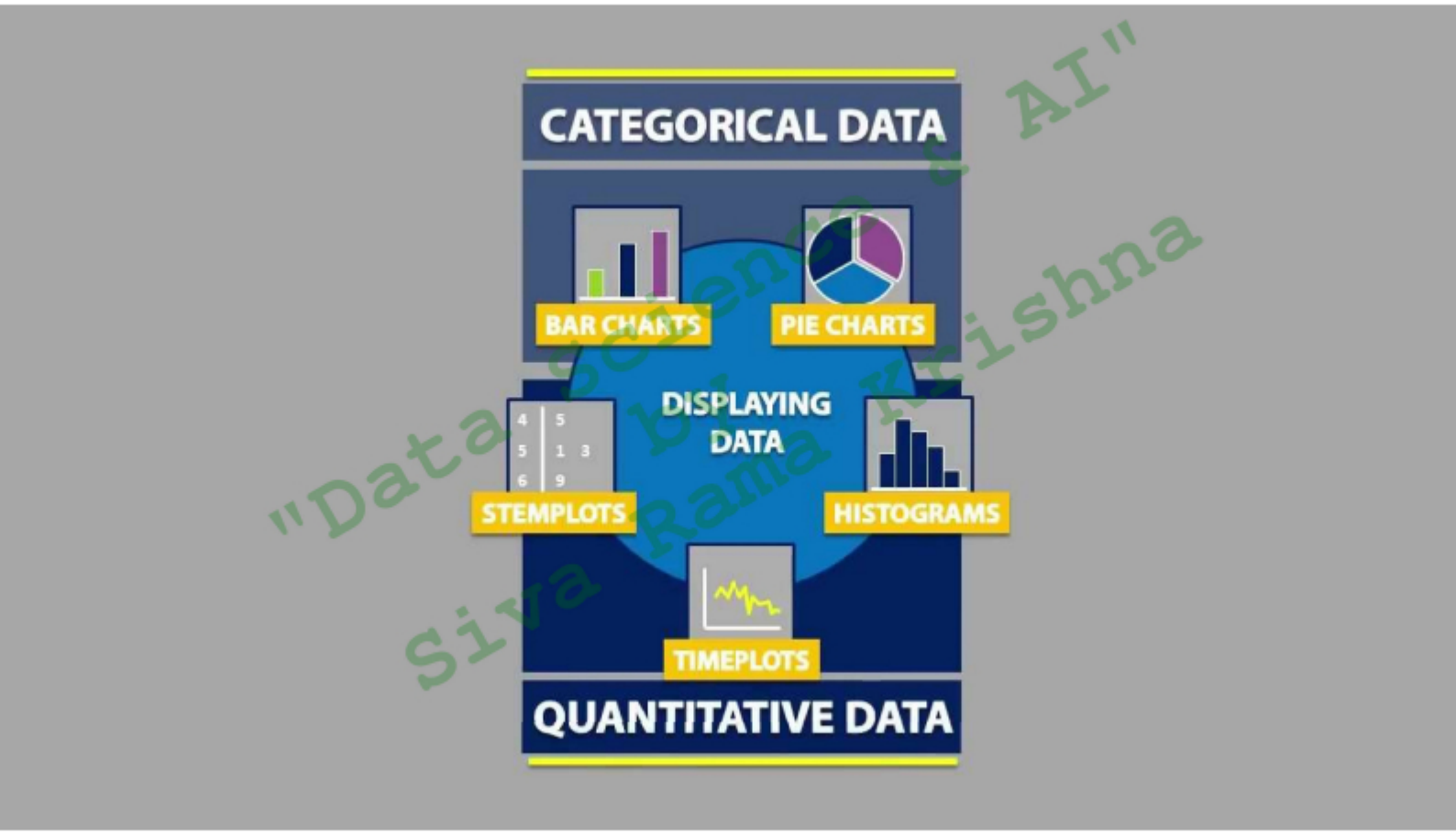
- **Descriptive statistics**
  - Collecting, presenting, and describing data
- **Inferential statistics**
  - Drawing conclusions and/or making decisions concerning a population based only on sample data

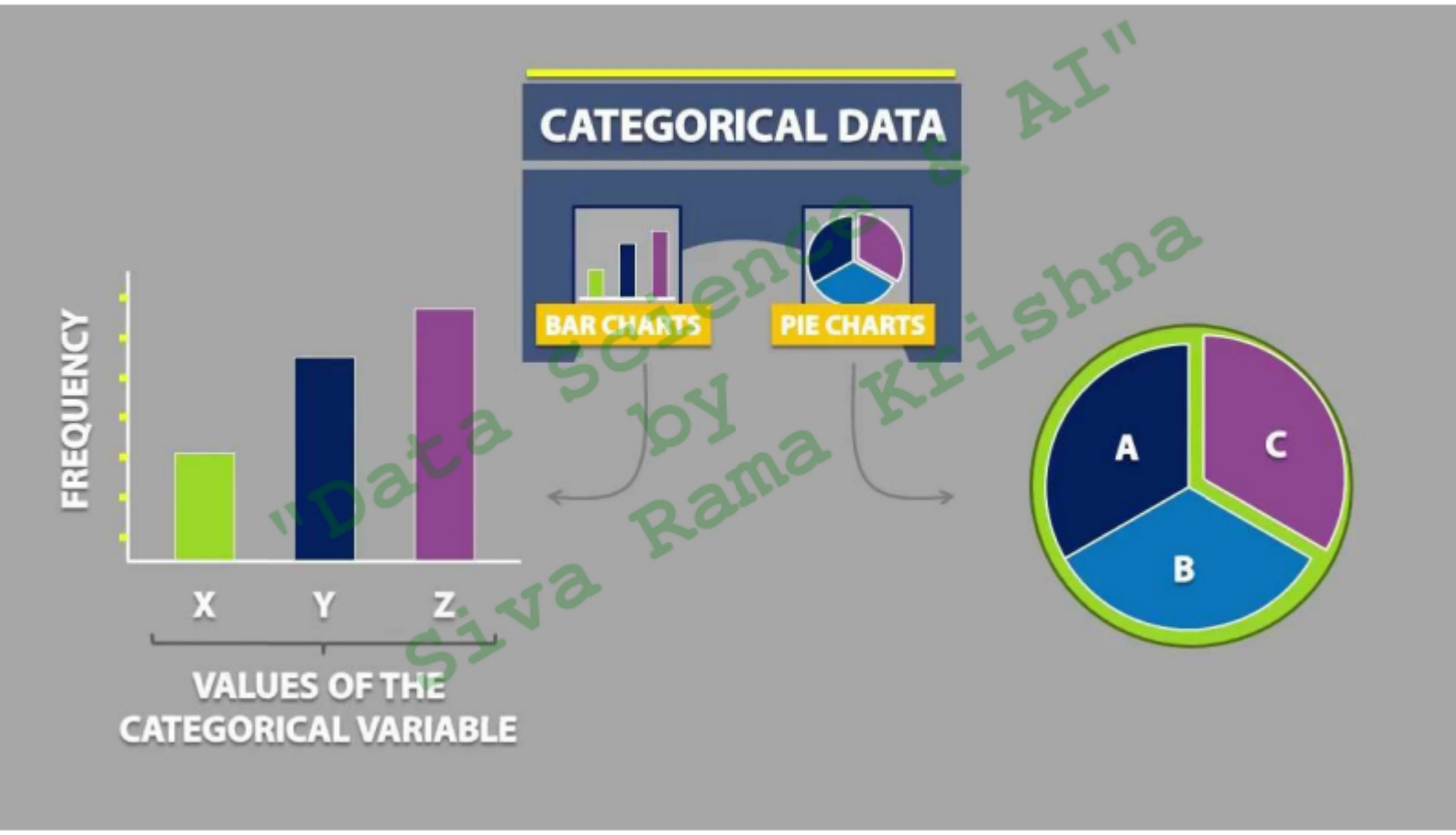
Populations and Samples

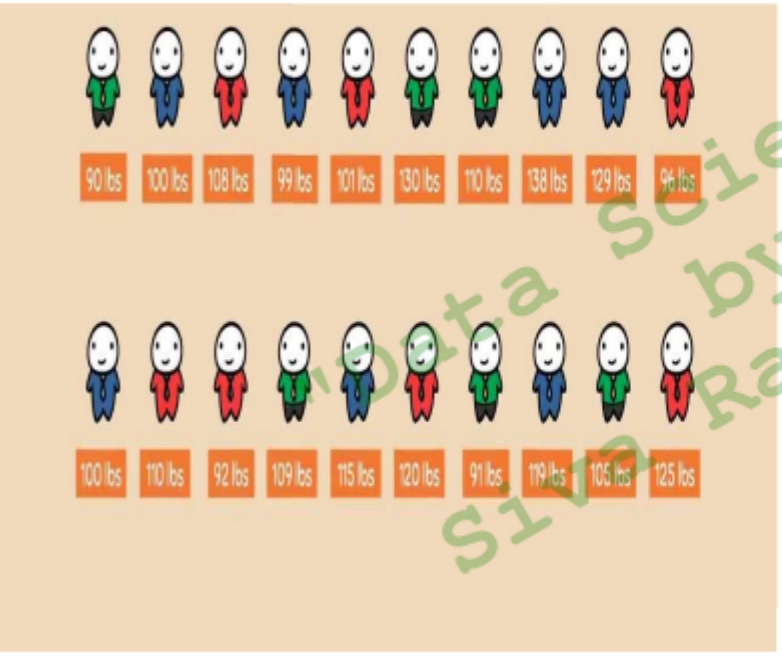
- A **Population** is the set of all items or individuals of interest
  - Examples: All likely voters in the next election
    All parts produced today
    All sales receipts for November
- A **Sample** is a subset of the population
  - Examples: 1000 voters selected at random for interview
    A few parts selected for destructive testing
    Random receipts selected for audit

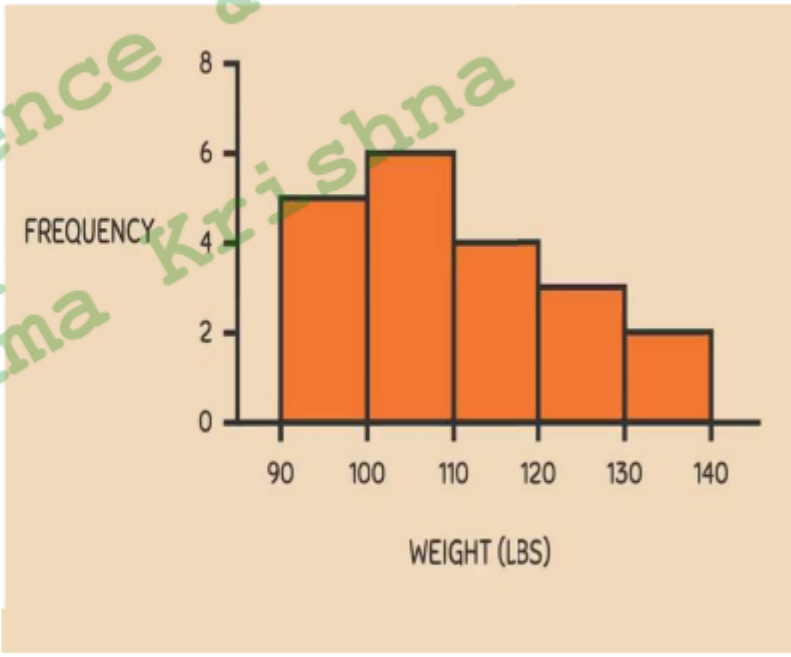
Why Sample?

- Less time consuming than a census
- Less costly to administer than a census
- It is possible to obtain statistical results of a sufficiently high precision based on samples.
- Because the research process is sometimes destructive, the sample can save product
- If accessing the population is impossible; sampling is the only option









FREQUENCY DISTRIBUTION

WEIGHT	
100 – 110	
110 – 120	120
120 – 130	130
130 – 140	
140 – 150	

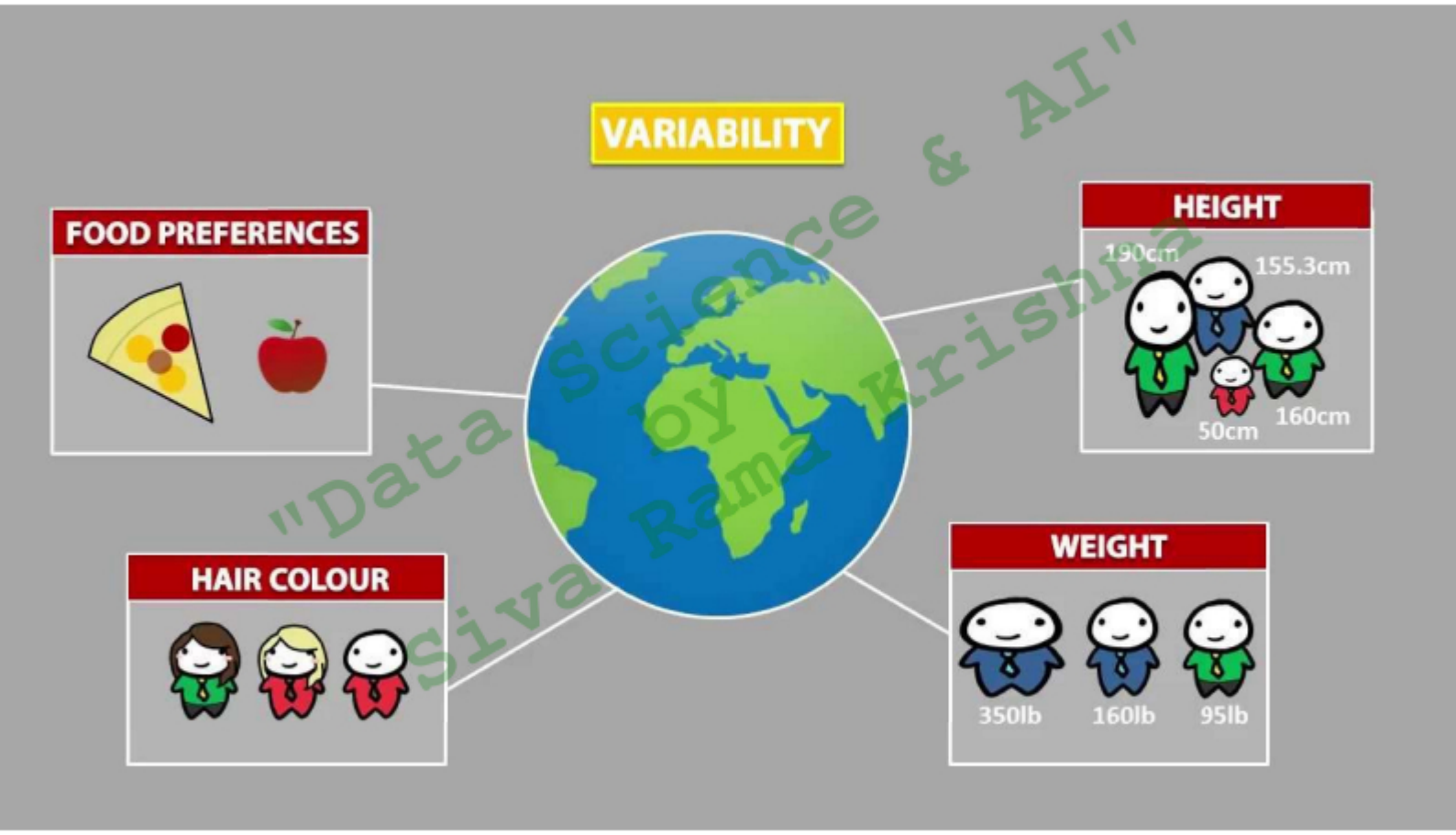
BY CONVENTION, WE SAY THAT EACH INTERVAL DOES NOT INCLUDE THE RIGHT END POINT

TIMEPLOT

SHOW HOW A VARIABLE CHANGES OVER TIME

TIMEPLOT

SHOW HOW A VARIABLE CHANGES OVER TIME



MEASURE

VARIABLE

QUANTITATIVE DATA

DATA THAT IS MEASURED IN NUMBERS. IT DEALS WITH NUMBERS THAT MAKE SENSE TO PERFORM ARITHMETIC CALCULATIONS WITH

QUANTITATIVE VARIABLES

HEIGHT

WEIGHT

MIDTERM SCORE

CATEGORICAL DATA

REFERS TO THE VALUES THAT PLACE "THINGS" INTO DIFFERENT GROUPS OR CATEGORIES

CATEGORICAL VARIABLES

HAIR COLOUR

TYPE OF CAT

LETTER GRADE

CATEGORICAL VARIABLE

CATEGORICAL AND ORDINAL

LOGICAL ORDERING TO THE VALUES OF A CATEGORICAL VARIABLE

EX: LETTER GRADE

F C C+ B B+ A A+

CATEGORICAL AND NOMINAL

NO LOGICAL ORDERING TO THE VALUES OF A CATEGORICAL VARIABLE

EX: HAIR COLOUR

RED BLONDE BROWN BLUE

QUANTITATIVE VARIABLE

DISCRETE

REFER TO VARIABLES THAT CAN ONLY BE MEASURED IN CERTAIN NUMBERS

EX: NUMBER OF PETS YOU OWN

0 1 2 30 2.7

CONTINUOUS

REFER TO VARIABLES THAT CAN TAKE ON ANY NUMERICAL VALUE

EX: WEIGHT

105 185 170.683